# South Haven Dory Plans

The South Haven Dory is a one-person rowing boat that is based on lines of the St. Pierre dory, a traditional dory hull shape. The construction method is plywood/epoxy/composite (stitch and glue) with no building mold. It is not an "instant" boat; there are many steps to go through and the result is a strong yet lightweight hull that uses the best properties of plywood and composite construction. This project is an attempt to create a boat with modern construction methods that has beautiful traditional lines. The design can be built out of three sheets of 1/4" plywood with a half sheet or so of 1/2" plywood and 1/2"x2" stock as framing. The wood can be purchased at any building supply store. The bottom is sheathed in a 6 oz fiberglass cloth.

The completed boat is light enough that a strong person can carry the boat a short distance, so the boat can be car-topped or trailered. An estimate for total cost is a little over $300. The boat is very fast under oars and is an excellent introduction to recreational rowing. It is stable if you are used to canoes and kayaks, but not as stable as a fishing boat (for example). I have been able to stand up in it in flat water, but it is a balancing

act. The best part about this boat is dropping the anchor and napping in the sun in the front of the boat. You can tell yourself that after rowing, you deserve to relax. I have written these instructions for someone who has had experience with epoxy and stitch and glue techniques, however a beginner could build this boat with help of a book such as "Devlin's Boatbuilding" by Sam Devlin.

If you are considering building this or any boat, I would recommend that you build a model first. I believe that the offsets and information on this page are correct, but I have not built a boat using this document yet, so you might want to make sure the panel shapes fit together before cutting up your ply. I took the information from my notes that I used to build my first dory, so I am fairly certain that the information is correct. I hope to check the lines by building another dory soon.

Completed Dories:

- Lobo De Mar II
- Dory Galadriel

# Vital statistics

- Length overall: 14'4"
- Maximum beam at aft seat frame: 52"
- Height at aft seat frame: 14 1/2"
- Weight: (don't know yet, coming soon!)

# Materials

- For my first version, I used BC Southern Pine Exterior 1/4" plywood (3 sheets) - marine plywood would be great
- 1/2" exterior plywood (half sheet)
- 1/2"x1 3/4" pine or fir battens (enough stock to scarf up four 15'2" battens, plus about 20' to be cut into spacer bars)- these could be cut from a 2"x4"
- 6oz glass cloth, about 15 yards
- 2 gallons epoxy resin, hardener, mixing pots, sticks, brushes
- colloidial silica or other silica epoxy filler
- Oil based enamel paint - 2 gallons
- Oarlocks
- Oar sockets
- 6 1/2' to 7 1/2' Oars

# Tools

Orbital Sander, 40 grit, 120 grit pads
Jigsaw
Framing square

Batten
Clamps - at least 10, 30 is best
Epoxy mixing pots, sticks, brushes
Drill with assortment of bits
Lineman's pliers
Wire cutters - small flush cutting
Gloves
Epoxy safety equipment, goggles, glasses, plastic or rubber gloves
Handsaw

# Scarfing

Sides - for each side, take a 1/4" plywood panel (4'x8') and cut it down the middle to create two 2'x8' parts. Try to make this cut fairly straight and center the cut line carefully on the panel, because in the middle of the panel, you will need exactly 2 feet of width. A table saw is best but on a good day you could do it with a jigsaw. Make a mark on the plywood so you know which plywood sheet face is the good side (if any) and which panel edge is the factory edge. Make sure you mark it so there will be a mark on both resulting parts that you cut out of the plywood sheet.

Scarfing - The idea here is to join the two 2'x8' panels to make a 2'x16' panel. Use a long work table (mine was 8' long). Dry fit the panels: Clamp one 2'x8' panel down with the

good face up, factory edge toward you, with the 2' edge at the middle of the table. Clamp the other panel next to it, butting the 2' ends tight next to eachother with the good side up and factory edge toward you to make a 2'x16' panel. Take two pins and some thread, and check to make sure that the 16' edge is reasonably straight. When you glue the panels together in the next step, it will be important that there is little space between the 2' ends to avoid a weak point, so if the long side is not straight then you may want to flip one of the panels to see if it works better the other way.

Glue-up - Lay a sheet of saran wrap in the middle of the table under where the joint will be. Cut two 4" strips of glass cloth (a little wider is OK) that are just a little longer than the joint (2'), and mark the middle (with 2" on each side) with a pencil at a few points. Wet out the glass strips, panel ends and the parts of the panel to be covered with cloth with epoxy (don't be epoxy stingy with this joint). Lay the glass strip centered on the saran wrap, wet it out some more with epoxy and set one of the 2'x8' panels on it so that it covers half of the tape (which you have marked at the center). Clamp the first panel down. Put the second panel on the tape, butting it up tight against the other panel, and aligning the long edges exactly. Tap the panels to make sure they are butted up tight against each other and are perfectly aligned on the sides. Clamp the second panel down tightly. Make a small amount of epoxy/filler mix (molasses consistency) and fill the area between the two panels with plenty of goo. Wet out the second glass strip liberally and put it on top of the two panels to be joined. I found it important to lay the top glass strip down immediately after pouring the epoxy/filler mix to avoid any air bubbles in the joint (I do have some air bubbles in the joints, there's probably no way to avoid them completely). Lay another sheet of saran wrap on top of the panels and glass cloth, and put something flat and smooth like a scrap piece of plywood on top of the joint, and weight it down (I used two 5 gallon buckets filled with water).

Wait 24 hours or until the epoxy cures completely. Remove the clamps and weights and inspect the scarf joint. Trim off the excess glass tape and sand lightly. Sanding into the weave of the cloth will reduce the strength of the joint and may result in dramatic failure. Paint on some clear epoxy to fill the weave of the cloth, repeat on the other side after curing. Repeat this procedure for the second hull side panel and the hull bottom panel.

# Cut out plan for sides, bottom, transom, hull doubler

### HULL SIDE PANELS - (2)

There are two sides which can be cut out together, by clamping down the two plywood panels one on top of the other. You will only have to draw the lines on one of the panels.

Lines - There are four lines or edges to the completed hull side.

- Top Line - long easy curve
- Bottom Line - long easy curve
- Stem Line - sharper curve
- Transom Line - straight line

In order to plot out the lines, a grid pattern is used, sort of like plotting out data on a graph. Set a panel on a long table supported at the ends, with the good side up, factory edge facing you. Make a mark at every foot along the factory edge of the panel. This will give you stations 0 through 16, label each mark with its station number starting with station 0 at the left edge of the panel. Label the marks just to the left of the mark so you can see the number when the framing square is on the mark. Take a framing square, and at each station, mark the following points with a sharp pencil. The offsets shown are measured from the factory edge, which should be the side toward you. While marking, remember that you need to use a high level of accuracy during this part of construction.

The dimensions are written in boatbuilder's notation, so 1-3-4 means 1 foot, 3 inches, 4 eighths (or 15 1/2"). A "+" means add a sixteenth to the dimension.

| **Station** | **Bottom Line** | **Top Line** | **Notes** |
|---|---|---|---|
| **0** | 1-3-4 | 1-3-4 | Sternmost point, top of transom |
| **1** | - | 1-4-0 | Bottom line is a straight line to next entry |
| **2** | - | 1-4-6 + | |
| **2 plus 4 1/2"** | 0-0-0 | - | Bottom of transom |
| **3** | 0-1-1 + | 1-5-5 | |
| **4** | 0-2-2 | 1-7-1 + | Top line corrected, 4/27/01 |
| **5** | 0-3-0 | 1-8-5 | |
| **6** | 0-3-5 | 1-9-6 + | |
| **7** | 0-3-7 + | 1-10-6 + | |
| **8** | 0-4-1 + | 1-11-3 | |
| **9** | 0-4-1 + | 1-11-6 | |
| **10** | 0-3-6 | 1-11-5 | |
| **11** | 0-3-0 | 1-11-2 | |
| **12** | 0-2-1 | 1-10-6 + | |
| **13** | 0-1-0 + | 1-9-7 + | |
| **14** | - | 1-9-2 | See next entry for bottom line |
| **14 plus 1"** | 0-0-0 | - | Bottom of stem, begin stem curve |

| | | | |
|---|---|---|---|
| **14 plus 6"** | 0-3-2 | - | Stem curve |
| **15** | 0-7-4 + | 1-8-3 | Bottom line is part of stem curve |
| **15 plus 6"** | 1-0-6 | - | Stem curve |
| **16** | 1-7-2 + | 1-7-2 + | Stem curve and top line meet in bow point |

Use a straight edge to draw the transom line, from Station 0 Bottom Line point to Station 2 plus 4 1/2" bottom line point.

Use a batten and clamps to draw the top and bottom line curves. Use a thin batten to draw the stem line curve, from Station 14 plus 1" Bottom Line to Station 16 Bow Point. If some of the points do not fit into a curve well, check your dimensions and if correct, draw the curve fair rather than bending the curve to meet the point. Please report any mistakes in the offset tables to me, Paul VandenBosch.

One word of advice about the curves at the forward bottom corner: if you are going to adjust the curve here, make the hull side panel bigger rather than smaller. Another way to say this is to adjust the curve out rather than in. This point is where the hull bottom and two hull sides come together in front. I have found that curving the bottom of the sides up at this point makes for a weak joint because it bends the hull bottom panel too much. You are better off straightening this part of the line out or even reversing the curve a bit to make the hull side bigger.

Lay the unmarked panel with the good side down. Lay the panel with the lines on top, carefully aligning the edges of the two panels. Clamp them together in a way that you can cut one of the lines with a jigsaw. Cut the line, readjust the clamps and make sure the panels are still aligned correctly, and continue cutting until the hull sides are completed. While the panels are clamped together, you may also drill holes for the wire stitches (see below).

## HULL BOTTOM PANEL

The hull bottom is drawn differently than the side panels. The bottom is symmetrical (side to side), so measurements are taken from a centerline down the middle of the panel. Only one bottom panel is required.

Scarf a 2'x16' panel as described above. You will not need all of this panel, only 2'x12' of it. With the good side up and factory edge facing you, cut off the left 4' of the panel so that what remains of the bottom panel is a four foot section, the scarf, and an eight foot section. (Alternately you could cut a 2'x8' panel in half before you scarf). Using a framing square, mark a centerline exactly one foot from the factory edge, and check to make sure that the centerline splits the panel exactly with one foot on either side, in particular at Stations 5, 6 and 7. With the factory edge facing you and the good side up, mark one foot stations along the factory edge, starting with 0 at the left. If all is well, the scarf should be

at station 4 or close to it. Check your centerline; if you run your framing square along the factory edge, the centerline should always show the same distance from the factory edge, and it should be very close to 12".

Take a framing square, and at each station, measure from the centerline (not from the factory edge where the stations are) and mark the offset from the centerline in both directions with a sharp pencil. Keep the framing square square to the factory edge. Note that the aft end of the bottom panel (at Station 0) is 1 1/4" wide, while the forward end comes to a point.

| Station | Offset |
|---|---|
| **0** | 0-0-5 |
| **1** | 0-4-4 + |
| **2** | 0-7-2 + |
| **3** | 0-9-1 |
| **4** | 0-10-6 + |
| **5** | 0-11-6 |
| **6** | 1-0-0 |
| **7** | 0-11-4 |
| **8** | 0-10-4 + |
| **9** | 0-8-4 |
| **10** | 0-6-2 |
| **11** | 0-3-3 |
| **12** | 0-0-0 |

Before you cut out the bottom, add marks on the centerline for the position of the footrest, oarlock, aft seat frame, forward seat frame. Use a heavy marker to mark these positions on the centerline so you don't lose these marks during construction. Label them so you will remember them in a few weeks/months. Note that the footrest is located for a six foot tall person, you may want to adjust it later by getting in the boat and figuring out what is comfortable.

| Item | Bottom Panel Station: |
|---|---|
| **Footrest** | 3 plus 2" |
| **Oarlock** | 4 plus 6" |

| Aft Seat Frame | 5 plus 8" |
|---|---|
| Forward Seat Frame | 6 plus 10" |

Use a batten to join the points, and cut out the bottom. Do not drill any wire holes in the bottom until assembly.

## TRANSOM

The transom is a small tombstone style transom which is also made of 1/4" plywood. Many designs call for a thick transom, however the small size of the transom means that 1/4" plywood is sufficient. The transom is drawn out on scrap plywood from the bottom or side panels, whereeever you can find a triangle area about 10" by 32" (note: corrected 7/21/01). Note that the transom must fit the actual dimensions of the bottom and side panels, and that the transom fits over the ends of the side panels (not inside them) and sits on the bottom panel. Draw a centerline about 32" long (note: corrected 7/21/01). Draw the transom bottom at a total of 1 3/8" wide, (0-0-5 + offset on either side of the centerline). Check the hull side panel and determine the transom side length. The total width of the transom at the top is 9 3/4" (0-4-7 offset on either side of the centerline). So you know the length of the transom side and the offset from the centerline. Make an arc from the bottom corner of the transom using the transom side length on each side of the transom. Then find the point on the arc that is exactly 0-4-7 offset from the centerline. This marks the top corner of the transom. After you have marked the top corner of the transom on both sides, you can draw the rounded transom top. I used a 4 to 6' radius (I didn't write it down!). Clamp down your part on a large table, and extend the centerline out past the bottom using a thread and pins. Install a clamp so that the bar is on the centerline about 5' from the transom top. Make a loop in baling wire and slip it over the clamp bar. Make a loop in the other end of the baling wire so that a pencil inserted in the loop passes through the transom top corners. Draw the curve. This is all easier to do than describe in writing. Cut out the transom. Do not drill wire holes in the transom until assembly.

## HULL DOUBLER

The hull doubler is optional. When I was putting my boat together, I had a fit of paranoia and thought that the hull would flex too much at the point where I stood on it to get in. So I cut a floor board from scrap 1/4" ply and epoxied it down under where the seat is and where the rowers legs are. It was 4 feet long and was cut a little smaller than the bottom. After the hull was assembled, I sanded the hull doubler to fit over the hull side tape and fillets, and laminated it down with lots of epoxy/filler and weight. I then filled around it with epoxy/filler and added glass tape to the sides. If you want to strengthen the boat but with some weight penalty, add a doubler. I installed mine from Station 2 plus 10" to Station 6 plus 10", which lines it up with the forward seat frame and extends it past the footrest. I will not put the doubler in my next boat because I think the seat frame and foot

rests stiffen the bottom enough. I want to be able to carry my boat, and every ounce counts.

# Assembly

The assembly method is to wire (stitch) the panels together and then to use a spreader to force the side panels apart, which bends the bottom up at the ends and gives the boat rocker. Because there is no frame, it is important that the wiring be equally tight on both sides of the boat, and that there is a regular pattern of wiring points. High stress areas such as the fore and aft ends of the bottom receive more wiring points. When spreading the hull to prepare for fiberglass and epoxy tape, the hull is supported at the two ends of the bottom and a weight is put in the middle of the boat.

I used a thin steel baling wire to wire the boat. It is not particularly thick. A slightly thicker wire might not cut into the plywood as much, but the baling wire did fine. The procedure I suggest is based on experience of having to restitch the boat two or three times to get to the point where I could spread the hull and fillet and tape the interior. You don't have to be this precise, but the way I describe it should work the first time.

Drilling holes for wire should be done symmetrically, so there are the same number of holes in the same places on both sides of the bottom. The best way to do this is to predrill the sides while they are clamped on top of eachother. Choose a drill bit that allows your wire to pass through the hole easily but without too much extra space. The wiring holes should be located as close to the edge of the panel as possible without allowing the wire to rip out the plywood. For the middle of the boat, where stresses are low, drilling the holes a little less than 1/4" from the edge of the plywood is acceptable. Near the corners and on the stem curve, stay about 3/8" from the edges.

## DRILLING THE SIDE PANELS

NOTE: Do not drill the transom or bottom until assembly.

Clamp the two hull side panels together and make sure they are aligned perfectly. Starting at the stem top, drill the first hole at the corner, 3/8" from both top and side. Drill a second hole 1/2" down from the first as a reinforcement. Drill the next three holes further down the stem, 1" apart. Then move down the stem and drill two holes 3" apart. Starting at the bottom of the stem, drill a similar pattern of holes moving up, making sure that the first is in the very corner of the stem bottom. Complete the middle of the stem by drilling holes about 3"-4" apart, evenly spaced.

At the transom bottom on the hull side, repeat the pattern, moving up the transom about half way. Repeat the stem top pattern at the transom top on the hull side. DRILL THE HULL SIDE, NOT THE TRANSOM.

Starting on the forward corner of the bottom line of the hull side, drill three holes about 1/2" apart. Drill the next three holes about 1" apart. Drill the next three holes about 2"

apart, and then continue to the middle of the panel at about 4"-6" apart. Repeat the pattern starting from the aft corner of the bottom line of the hull side.

## DRILLING/WIRING/STITCHING

Wiring is basically taking a length of wire, sticking it through two holes, aligning the panel edges and twisting the wire tight.

Just keep in mind through this process: the bottom fits over the hull side edges and the transom edge. The transom fits over the hull side edges.

Start by wiring three or four holes in the middle of the stem curve. Do not wire the corners at this time. These first stitches are preliminary and should be slightly loose. You will likely remove them and replace them with tighter wire stitches later, because the bending involved in getting the hull to the right shape will stretch and weaken the preliminary stitches. Next, align the transom and drill three or four holes on either side of the transom to match the holes in the hull side exactly. The transom bottom should be even with the hull side bottoms, and the transom fits over the ends of the hull sides. It is very important to position the holes so the wires will pull the parts together with the correct alignment. Wire a few preliminary stitches on both sides of the transom and the hull sides. Check the alignment of the stem bottom, and wire the stem bottom corner reasonably tight but not so tight that the wire will be ripped out when the sides are spread to fit the bottom. Repeat with the stem top, and transom tops and bottoms. Check alignment, drill a few holes, wire them up, and move on until the stem curve and transom are wired up completely.

To add the bottom and turn the flexible mess into a boat, turn the hull upside down on a table, and start at the rear corner where the transom, sides and bottom come together. Drill three holes along the width of the transom bottom. Align the hull bottom with the transom bottom, with the hull bottom over the transom edge and drill the mating holes in the correct position. Putting the holes in the right place is very important! Wire them up tight. Spread the sides out a little so they roughly approximate the shape of the bottom, and put the hull bottom on the edge of the side. Starting at an aft corner, drill a couple of holes in the bottom to match the first few holes on the side panel. Do not drill more than a few holes at a time. Wire them up, and move to the other side, repeat. Continue this process a few holes at a time until you reach the stem. Complete wiring any holes that are not yet complete.

Is the bottom longer than the sides? I drew up the plan so that the bottom should be a little longer than the sides. When you get close to wiring the forward end of the bottom, mark the shape of the sides on the bottom, and use a jigsaw or sander to trim the bottom down so the bottom and sides fit together well. This is the area where you will be able to tell if I did a good job writing down the offsets. Please let me know how this fit for you at admin@cruisenews.net.

Check alignment, are there any problems? If so, feel free to remove any old stitches that are not holding the hull together correctly and to drill new holes and restitch. Go through all of your stitches and inspect the wire carefully. Hit it lightly with a pliers and if it is loose, tighten it up until it sings. Grab it with the pliers and shake it a little and see if it breaks. Don't cut off the ends yet. Check each one. Everything OK? Then its time to spread the hull.

Turn the hull over (avoid getting jabbed by the thousands of sharp points!) and support it by a couple of cinder blocks (or similar) on the floor, with the blocks near the fore and aft ends of the bottom panel. Put a weight in the middle of the hull (5 gallon pail full of water) and watch the hull assume a beautiful shape. Take a piece of wood and a few clamps and find a way to spread out the hull sides a foot or two aft of the middle of the boat. I fastened a clamp on each side of the hull and cut a batten to the right length to stretch the sides by jamming the batten under the clamps. After admiring it for a while, remove the weight and spreader until you are ready to fillet and tape the inside. You should install the spreader when you tape both the interior and exterior chines.

# Taping the hull

Cut 4" wide pieces of 6 oz fiberglass tape. You will need two pieces about 14' long (measure the inside chines and add a few inches on each side), a piece for the stem about three feet long, and two pieces for the transom about 2 1/2' long.

Taping is a job that you have to do in one shot. Running out of epoxy and running to the store for more halfway through is probably going to be a disaster. So have your workshop organized, prepare for every step of the process, have the stirring sticks, the plastic gloves, the goo squeegee, the silica filler powder, the tape, the cleanup products, plastic bag, trash can, rags and and everything that you will need standing out on display. Go through a dry run and imagine goo dripping everywhere, how do you deal with it?

Check each wire again, replacing any that are broken, loose or are of questionable strength, and when you are satisfied with the wiring and the boat seems ready to be glued together, put the hull back on the blocks and weight the center. Put the spreader in and stretch the boat just a bit further than you want it to be when its done (it will relax a little when the spreader is removed). Look at the alignment of the edges, and at the curves of the sheer (top). Hang a plumb bob and look down the centerline. Does it look pretty fair and balanced, no bulges out to one side? If so you are ready to rock and roll.

Take a large flat screwdriver and gently push each and every wire in towards the joint on the inside of the boat. Take a one inch paintbrush and paint clear epoxy on the plywood about 3" on either side of all the joints. Mix up a pot of thick epoxy/filler (peanut butter consistency) and use a squeegee together with a one inch putty knife to push the filler into the joint. Another way to do this is to use a plastic bag and cut a small hole in the corner and squeeze the epoxy/filler out. Use a rounded stick or squeegee to cove (round) the filler, maybe a 2" radius curve in the middle of the bottom, and 1" or less in the stem. Clean up any extra filler laying outside of the coved (rounded) area. A good cove is about

one inch wide (more or less), except for the stem which will be narrow due to the sharp angle. Use a lot of filler in the stem. Have you filled all the joints? Have you cleaned up the extra goo? Good, move on to the tape.

Gently lay the dry tape along the joints centered on the joint. There should be at least an inch or more of tape touching the plywood outside of the filler cove. More is better. Try not to gouge into the filler cove too much, be gentle, no need to push it in or anything. Take the paintbrush and paint clear epoxy over the tape, sticking it down. Keep it centered nicely. Are you getting gooey threads that are a pain to deal with? Me too. If you can get them off with the paintbrush, slobber them on to the wastebasket or a piece of cardboard or something. Otherwise just leave them hanging in the air rather than disturb the rest of the tape. You can get them off after the epoxy cures.

You can cut off the ends of the tape that hang over before you start epoxying it, or you can let them hang over the top of the hull a little and cut them after the epoxy cures. Overlapping the tape at the bottom corners is a good thing, it strengthens the hull at a high stress spot. Keep putting tape down until all the joints are covered. Are you thinking that this will never be strong enough to float your bloat? You could add another layer of filler and tape along the stem. This is the joint that I think needs a little strengthening, although I have not had any problems. I used one layer of tape on the inside joints (except where the tape segments overlap).

When you are done, make a final inspection, then stop poking at it, turn off the light, leave the room, shut the door, and don't let anyone near the boat for 24 hours, including you. Don't try to change it while it is curing, you will only make things worse.

After 24 hours or more, remove the spreader, take out the weight, and clean up the glass that is hanging above the hull top, if any. Don't start cleaning up the inside yet, let it cure at least another day first. Turn the hull over, avoiding the many sharp wire points. Use a wire clipper to clip all the wires off of the outside. If you can pull the wires out, go ahead, but if they won't come out, leave them and just clip them off flush. Use a diagonal wire cutter to get them close to the wood. Sand the all of the outside chines (joint corners), stem and transom joints so they are rounded nicely. They should all have nice round corners, not sharp corners. Now put 4" tape and clear epoxy on all the outside corners. You may have areas where the tape won't lay nicely, try shorter pieces of tape in those areas. Once again, let the epoxy cure a day, lightly sand any rough stuff and then paint another layer of clear epoxy over the tape to fill the weave. Let cure. Flip the boat, lightly sand any rough areas on the tape on the inside of the boat, and paint a layer of clear epoxy over it to fill the weave. Let cure. You now have a hull which will need only minor framing to make it ready to row.

## Sheer Clamps - part 1

Sheer clamps are the boards which strengthen the top of the hull. Right now, you are just going to put the outside sheer clamp on. I used 3/4"x1 1/2" pine or fir boards which were sold as furring strips and were extremely cheap. 3/4" is too thick, you may want to reduce

the sheer clamp battens down to 5/8" or even 1/2", they will be easier to work with. The other dimension is less important for structural strength, anything between 1" to 3" would be OK, whatever you think looks nice. Next time I would use nominal 2"x4" pine boards cut down to 1/2"x2". There are three layers plus the hull width, so you will still get a strong sheer clamp with a narrow batten. I like the looks of a thick sheer clamp, but it's definitely another area to remove some weight from the boat with no strength loss.

You will need to scarf pieces together to make 15'2" pieces. There will be a lot of stress at the scarf area so make sure you are scarfing ends together with no weak knots or cracks. I used an 6" scarf, trying to get 15' out of two 8' sections and one of my scarfs cracked so you might want to go with a 10" or 12" scarf with two scarfs per batten if you are using 8' stock. I wasn't too concerned about the crack, I just smeared epoxy/filler (molassess consistency) in and outside the crack, put a piece of saran wrap around it, and clamped a piece of furring strip next to it as a sister to make sure it cured with the right curve.

What, you don't know how to scarf? Well, you probably should get a book on boatbuilding, but basically it is cutting an angle into the end of a stick, and cutting the same angle into the end of another stick, and gluing the two sticks together. When I talk about a 10" scarf, it means to start the angle 10" from the end of the stick. I drew a line which showed the area I wanted to cut off to make the angle, and then took a hand saw and cut it off. Then I took the orbital sander and smoothed it out and made sure both angles fit each other OK. Then I glued them with epoxy/filler and clamped them down so they made for a straight 15' stick.

Gluing the outside sheer clamps is a matter of wetting the hull top and sheer clamp with epoxy and clamping the two together. Do one side at a time and have at least 10 clamps (more is better). Sometimes the batten doesn't quite want to follow the curve of the plywood and you have to clamp it hard and bend it hard. If you have to fight it, you might want to let the sheer clamp take it's natural shape and either carve off the additional plywood which sticks up after it cures or fill in the hole with more epoxy/filler and plywood after you add the inner sheer clamps. I had to do both on my boat, which means the top curve should be adjusted, but it wasn't by much. The solution is to use battens that are not very thick. I will use 1/2" battens on my next boat.

Cut the sheer clamps off flush with the hull at the ends, or if you like, you can cut it so the forward end is pointed, which is a little bit more difficult cut, but the boat would probably look better with a pointed sheer clamp. When the first outside sheer clamp has been installed and is cured, stand in the front of the boat and imagine the centerline as it passes through the sheer clamp. Cut the sheer clamp along the centerline. Before installing the second sheer clamp, cut the end to fit the first sheer clamp and use lots of epoxy/filler between the two.

If you don't have enough clamps, there is another way. You will have to start by installing the inside sheer spacers (see below) and put them in to be able to use screws to hold the outside sheer clamp in place.

Are the outside sheer clamps cured? Good, let's move on.

## Glass the Bottom

Flip the boat bottom side up, and cut a piece of glass cloth exactly the size of the bottom. Don't try to let it overhang the corners, it will create folds and will not lay right. Pour and brush clear epoxy on the glass and bottom until it is saturated. Let cure, then brush on more epoxy to fill the weave. You could glass the sides too, but be prepared for an increase in weight. I don't think its worth it, because I want to be able to carry the boat on my own. For rough use on rocky rivers I might consider it.

## Install Skeg

To cut the skeg shape, put a piece of 1/2" ply on the aft part of the bottom. The skeg should start well aft of the lowest point (highest when upside down) of the bottom curve. Take a straight edge and draw what you think would be a good skeg. Then go to the transom, and extend the angle of the transom on to the skeg. Cut out the skeg triangle. Lay it on the hull and decide if you like it. If so, use it as a pattern to cut another 1/2" plywood board with the same shape. Glue the two boards together to make a 1" skeg. Round the outer edges of the skeg (but not the side against the hull) so they are very round. Line up the skeg on the hull so that it is in line with the centerline of the bottom. Make up five 4" tape pieces a little longer than the length of the skeg. Paint the hull in the skeg area and the skeg with clear epoxy. Mix up some epoxy/filler (peanut butter consistency) and smear it where the skeg will be attached to the hull. Push the skeg down into the goo all the way till it touches the hull, and then cove the epoxy/filler. Add tape to the joints and brush on clear epoxy. Add more tape, the more layers across the top of the skeg, the better, this area takes a beating. If you can't get the tape to bend around the back end, let it hang out and sand it down after it cures, and then put another layer on the back end. Let it all cure, sand, and brush on clear epoxy to fill the weave. If you think you need to add more tape to the back of the skeg or the top, do it.

## Paint Bottom

Let the epoxy cure for at least a week. Brush on an oil-based enamel paint in the color of your choice. To do it right, you need five or more coats. At a coat a day, this takes a while to get done. Let the last coat dry a week or more.

## Sheer Clamps - part 2

I'll assume you have the outside sheer clamp installed. This design depends on the sheer clamp to hold the hull in shape. To make it look really authentic, and also to let water run out when you lay it on its side, you can use sheer spacer blocks. These are just pieces of the same wood that you use for the sheer clamps cut to a standard length, say 4" or 6". These parts are then glued on the inside hull top, aligned with the top of the outside sheer clamp, and are spaced a standard length from each other, say 3" or 4". The ends and the

oarlock areas are made with 12" blocks for strength reasons. I would suggest making the spacer blocks 3/4" wide, but 1/2" will work if that is what you have.

The inner sheer clamp is glued to the spacer blocks. The transom is a little difficult because it is rounded. I just glued straight battens across it and then sanded and ground them down to a rounded shape. Not fine cabinetry work but effective.

The ends and transom corners of the inner sheer clamp will have to be cut to join with an angle. I just look at them and imagein the centerline and maybe mark where I want to cut it and at what angle, and then use a handsaw to cut it. This is not accurate and leaves open spaces, so I put plastic tape around the bottom and side of the joint and try to shape the tape how I want the part to look and then fill the joint with epoxy/filler (molasses consistency). You could also epoxy a piece of fiberglass tape under the forward joint (breasthook?) for strength, or pour some epoxy/filler (molasses consistency) under the joint while the boat is upside down.

## Seat Frame

There are two seat frames, forward and aft. The aft seat frame is located at 5'8" forward of the hull bottom/transom joint, and the forward seat frame is located at 6'10" forward of the hull bottom/transom joint. Each frame is made of three parts, a seat base and two arms. The seat base is made out of 1/2" ply cut to a width of 6 3/4" (which is the height of

the seat above the floor of the boat). The bottom of the seat base is cut to the width of the hull bottom, and the top width is the width of the hull sides at 6 3/4" above the hull bottom. In other words, cut it to fit into the boat. I would suggest you use the centerline method, where you measure the distances, divide them in half, and plot the distances out on either side of a centerline. This gives you a pretty good chance that the part will fit the hull.

The arms are 3" wide 1/2" plywood, and are cut to taper from 3" at the top of the seat base down to the width of the inner sheer clamp, where it touches the sheer clamp. The seat base goes inside the arms and holds up the seat. Install the seat base and arms by painting all mating surfaces with clear epoxy, then join the parts and hull with lots of epoxy/filler (peanut butter consistency). Clamp the seat base and arms together, then cove the joints. I did not use glass tape here, but you could. You can also do this in steps to make sure it fits right, for example epoxy the arms and base together while inside the hull, then install the assembly inside the hull. It should work OK either way. I added a cleat on the inside of the seat base to help hold up the seat and keep it from falling in when I tried to open it, but I am not sure that this is needed. I did not add limber holes. The advantage of limber holes is that you have only one puddle in the boat instead of three, but I personally would rather keep the mud and oar splash in the aft area so the front stays clean and I can lay down in it.

## Seat

Cut a piece of 1/2" plywood to fit inside the seat frame arms on the seat base, from hull side to hull side. The seat is just laid on the seat bases, no hinges or anything. It might be a good idea to tie it to the boat somehow, in case of capsize. At 14" wide, I find the seat is wide enough to hold a 2 liter pop bottle full of water, a personal floatation device, small danforth anchor and line, plastic cup and sponge for bailing, and a cleanup rag. I also keep a couple of boat cushions up front to lay on and watch the sky at anchor, one of my greatest joys in life.

## Foot Rest

The foot rest is also 1/2 " plywood, and is just a mini frame which goes 5" up the hull side, and 5" along the hull bottom. Use a bevel guage or two pieces of wood to figure out the angle of the hull. The top is curved in a way that I imagine will give me two ways to brace my feet, high and low. I put the foot rest into the boat vertically. I located the foot rests at 3'2" forward of the hull bottom/transom joint. This is for a six foot tall person, I suggest you get in the boat and check to make sure your foot rest location fits you. Install the foot rests by painting all mating surfaces with clear epoxy, then join the parts and hull with lots of epoxy/filler (peanut butter consistency). Cove the joints and add a small amount of glass tape and epoxy, at least on the forward side.

I'm sure that there are many ways to make a foot rest. The advantage of this style is that it serves to strengthen the hull.

## Paint Interior

Lightly sand any rough spots, and paint with oil based enamel. I covered the seat board with epoxy and plan to varnish the seat board, but the rest of the boat is all gloss white oil-based enamel. Maybe I will put a blue stripe on it to make it pretty. The paint takes a while to dry, you can add a new coat every day, but expect to wait a week for the final coat to be dry enough to use.

## Oarlocks

I used a pair of bronze ribbed horn oarlocks, (Defender 2001, p. 169, Item 450626) and a pair of bronze top mount sockets, (Item 450631). I also tried the round horns, they did not work well due to the angle of the sheer clamp. You may have made a mark on the centerline of the hull bottom for positioning the oarlocks (see Bottom Panel cut out plan). It's important to check to make sure that the oarlocks are 14" aft of the aft edge of the seat. I centered the sockets in the sheer clamp, which means drilling directly adjacent to the hull side, take care. I tie a loop of line to the bottom of the oarlock and then use a figure eight knot to keep the oarlock from falling out if capsized.

## Oars

I have 6 1/2' oars from West Marine. Seven foot would probably work better. I did not put leathers on them, I just wrapped 10"x12" glass cloth and epoxy around the area where it rubs against the oarlock. I don't know if this works so you might just want to use the traditional leathers. I hold the oars in place by tying a line around the oar with a series of tight rolling half hitches and then bringing the line up around the oarlock and tying it off on an opening in the sheer clamp. By adjusting the knot at the sheer clamp, you can put the oar at the precise extension out that you want. This method also secures the oars to the boat.

## Fishing

I intend to drill a hole low on the aft seat base to fit my favorite fishing rod. I might have to add a layer or two of plywood on the inside of the seat base to make sure the rod stays at the right angle. I want it to stick straight back with the tip about 3' over the back of the boat. The pole has to be kept low out of the way of the oars, but thats OK, then I don't have to look up to see if I have a fish. Fishing is a great excuse to get on the water. "Honey, I'm going fishing, see you later!" echoes back with "Good riddance, I'm going shopping". No questions asked, just do it. Even if you don't like to fish I suggest you get a license and a cheap fishing rod, and the biggest, most outrageous fishing lure that most normal size fish run in fear from. Why? The bigger the lure is, the more macho the fisherman. By rowing up and down the harbor dragging your ridiculous lure, the motorboat crowd will think you are the most rabid fisherman out there and will steer clear, thinking that you are second cousin to Popeye. The 100+ hp fisherman types will throw you an extra salmon now and then, just because anyone who ROWS to troll has got to be a real die-hard fisherman. And when a fish bites your oversize ridiculous looking

lure, it will probably be the biggest fish in the harbor and it will tow you around for an hour.